Ryan Lau

IB MYP Year 5

Year 10 Mathematics

Assessment #3

TRIGONOMETRIC PATTERNS

Unit Question: How do we get around? aTeachers: Ms. Luk & Mr. Slosberg
End Date: March 15, 2013 Time Allowed: Double Lesson
Concept Statement: The student will discover one or two formulas which will be useful in the future.

The objective of this task is discover a useful formula for finding out new trig. values from old ones.

IN YOUR BOOK:

- New Trends Mathematics, Chapter 3 & 9 on Trigonometry

INSTRUCTIONS:

- Read the **instructions** and **rubric** carefully.
- Show all **steps** and proper **units**.
- Submit **your own work.** Any copying or other cheating, will automatically receive a 0.
- You are allowed to use non-electronic **dictionary**.
- **Calculators** are allowed.

ASSESSMENT:

- Read the criteria descriptors on the next page carefully before you start your work. This will give you a clear understanding of what is required and what a quality piece of work for this task must include. This way you give yourself the best chance of achieving the highest level in this task.
- This task assesses Criteria B.

Criterion B: Investigating Patterns

Achievement level	Task Specific Rubric	IBO Published Descriptor	Student's Self-Evaluation
0	The student does not reach a standard described by any of the descriptors given below.	The student does not reach a standard described by any of the descriptors given below.	
1–2 **Do Maths**	The student can calculate trigonometric values correctly.	The student **applies, with some guidance,** mathematical problem-solving techniques to recognize **simple** patterns.	**(0-8)**
3–4 **General Rule**	The student comes up with a general rule relating the trigonometric ratios.	The student **applies** mathematical problem-solving techniques to recognize patterns, **and suggests** relationships or general rules.	**Teacher's Final Grade**
5–6 **Test it**	The student tests their general rule by taking a few more examples.	The student **selects and applies** mathematical problem-solving techniques to recognize patterns, **describes** them as relationships or general rules, and **draws conclusions** consistent with findings.	
7–8 **Prove it**	The student explains how certain they are that they are right and why.	The student **selects and applies** mathematical problem-solving techniques to recognize patterns, **describes** them as relationships or general rules, draws the **correct conclusions** consistent with the correct findings, and **provides justifications or proofs.**	**(0-8)**

ASSESSMENT

Level 1-2

1. Given the following expressions, evaluate
    a. $\sin(x)$
    b. $\sin(2x)$
    c. $\sin^2(x)$
    d. $\cos(x)$
    e. $\cos(2x)$
    f. $\cos^2(x)$

   for $x = 30°, 150°, 240°, 330°$.

Level 3-4

2. Organize the data you found from question 1.
3. Describe a general rule you found involving either $\sin(2x)$ or $\cos(2x)$

Level 5-6

4. Suggest another example or two to make certain it is right.

Level 7-8

5. Test your pattern with other methods/identities, justify your formula(s) and give limitations if there's any.

~ End of Assessment ~

Ryan Casberg Y10T (2)

1. $\sin(x)$

$\sin 30^\circ = \frac{1}{2}$

$\sin 150^\circ = \frac{1}{2}$

$\sin 240^\circ \; -\frac{\sqrt{3}}{2}$

$\sin 330^\circ \; -\frac{1}{2}$

$\sin(2x)$

$\sin 2\times30^\circ = \frac{\sqrt{3}}{2}$

$\sin 2\times150^\circ = -\frac{\sqrt{3}}{2}$

$\sin 2\times240^\circ = \frac{\sqrt{3}}{2}$

$\sin 2\times330^\circ = -\frac{\sqrt{3}}{2}$

$\sin^2(x)$

$\sin^2 30^\circ = 0$

$\sin^2 150^\circ = 0$

$\sin^2 240^\circ = 0$

$\sin^2 330^\circ = 0$

$\cos(x)$

$\cos 30^\circ = \frac{\sqrt{3}}{2}$

$\cos 150^\circ = -\frac{\sqrt{3}}{2}$

$\cos 240^\circ = -\frac{1}{2}$

$\cos 330^\circ = \frac{\sqrt{3}}{2}$

$\cos(2x)$

$\cos 2\times30^\circ = \frac{1}{2}$

$\cos 2\times150^\circ = \frac{1}{2}$

$\cos 2\times240^\circ = -\frac{1}{2}$

$\cos 2\times330^\circ = \frac{1}{2}$

$\cos^2(x)$

$\cos^2 30^\circ = -1$

$\cos^2 150^\circ = -1$

$\cos^2 240^\circ = -1$

$\cos^2 330^\circ = -1$

2.

degrees	sin	cos	$\sin^2$	$\cos^2$
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	-1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	X	X
150°	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	-1
240°	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	0	-1
300°	$-\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	X	X
330°	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	-1
[illegible]°				
480°	$\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	X	X
660°	$-\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	X	X

X = no answer

Ryan (4101)

multiple of 180

6000

3. The general formula for $\cos(2x) = \pm\frac{1}{2}$.

4. 1. $\cos 120^\circ = -\frac{1}{2}$

$\cos 60^\circ = \frac{1}{2}$

$\cos 960^\circ = -\frac{1}{2}$

5. Another method of calculating x would be $\cos 6000^\circ$ or in other words, could all be multiples of 180 which will result in a $\frac{1}{2}$ equation answer.

			sin	cos	tan
	0		~~cos~~	~~tan~~	
	30	1 π 6	$\frac{1}{2}$		
-	45	1 π 4	$\frac{\sqrt{2}}{2}$		
	60	1 π 3	$\frac{\sqrt{3}}{2}$		
	90	1 π 2	1		
	120	2 π 3	$\frac{\sqrt{3}}{2}$		
-	135	3 π 4	$\frac{\sqrt{2}}{2}$		
	150	5 π 6	$\frac{1}{2}$		
	180				
-	210	7 π 6	$-\frac{1}{2}$		
-	225	5 π 4	$-\frac{\sqrt{2}}{2}$		
	240	4 π 3	$-\frac{\sqrt{3}}{2}$		
	270	π 2	-1		
	300	π 3	$-\frac{\sqrt{3}}{2}$		
-	315	π 4	$-\frac{\sqrt{2}}{2}$		
	330	π 6	$-\frac{1}{2}$		
	360		0		